



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/590,822

11/19/2008

Yoshinao Wada

1035-652

2188

23117 7590 01/12/2011
NIXON & VANDERHYE, PC
901 NORTH GLEBE ROAD, 11TH FLOOR
ARLINGTON, VA 22203

EXAMINER

IPPOLITO RAUSCH, NICOLE

ART UNIT

PAPER NUMBER

2881

MAIL DATE

DELIVERY MODE

01/12/2011

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/590,822	Applicant(s) WADA ET AL.	
	Examiner NICOLE IPPOLITO RAUSCH	Art Unit 2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Drafts, Person's Patent Drawing, Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>8/25/2006</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Oath/Declaration

1. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because: Two of the inventor's signatures are missing.

Information Disclosure Statement

2. The information disclosure statement filed 8/25/2006 fails to comply with 37 CFR 1.98(a)(3) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each patent listed that is not in the English language. Specifically JP 6-508472 lacks any translation, even the abstract. It has been placed in the application file, but the information referred to therein has not been considered.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 4 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Shen et al. ("Porous Silicon as a Versatile Platform for Laser Desorption/Ionization Mass Spectrometry", *Analytical Chemistry* 2001, 73, pp.612-619, from hereinafter "Shen").

6. In regards to claim 4, Shen teaches a sample target comprising, as a sample support surface, a surface which is used to support a sample in ionizing the sample on the basis of laser irradiation (page 612, column 2) so as to perform mass spectrometry and which has a finely bumpy structure of not less than 1 nm and less than 1 μ m (FIG. 4, page 615 column 2), wherein the bump structure of the sample support surface is arranged so that a plurality of concave portions are regularly formed (FIG. 4 illustrates the regularity, FIG. 3 the "bumpy-ness").

7. In regards to claim 15, Shen teaches a method for producing a sample target including, as a sample support surface, a surface which is used to support a sample in ionizing the sample on the basis of laser irradiation so as to perform mass spectrometry (page 612, column 2) and which has a finely bumpy structure of not less than 1 nm and less than 1 μ m (page 615 column 2), said method comprising the step of repeatedly disposing concave portions on a surface of a substrate in accordance with lithography

Art Unit: 2881

(page 613, column 2, "photopatterning", also pages 616-617) so that an interval of the concave portions is not less than 1 nm and less than 1 um and a width of each of the concave portions is not less than 10 nm and less than 1 um, so as to form the sample support surface on the surface of the substrate (page 615 column 2 has the dimensions).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-3, 5-15 and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shen et al. ("Porous Silicon as a Versatile Platform for Laser Desorption/Ionization Mass Spectrometry", Analytical Chemistry 2001, 73, pp.612-619,

Art Unit: 2881

from hereinafter "Shen") in view of Wood et al. (U.S. Patent Application Publication Number 20040094705, from hereinafter "Wood").

11. In regards to claims 1 and 13, Shen teaches a sample support comprising, as a sample support surface, a surface which is used to support a sample in ionizing the sample on the basis of laser irradiation so as to perform mass spectrometry (page 612, column 2) and which has a finely bumpy structure whose interval between concave portions or convex portions ranges from 1 nm-10 um (FIG. 4, page 615 column 2).

In regards to claims 1 and 13, Shen fails to teach that a face of the sample support surface is coated with metal.

Wood teaches that a face of the sample support surface is coated with metal (FIG. 8 illustrates a DIOS plate similar to Shen only with larger pores, paragraphs 0099-0100 teaches metal coatings, also paragraphs 0127-0131).

In view of the teaching of Wood it would have been obvious to one of ordinary skill in the art at the time the invention was made that a face of the sample support surface is coated with metal. So doing strengthens the support surface, and prevents the absorption of the sample into the support surface (metal is much less porous than, say, silicon). Metals are also more resilient than other materials, and so the coating helps to protect the support surface as well. For at least these reasons, it would have been obvious.

12. In regards to claim 2, Shen as modified by Wood as discussed above fails to teach that the metal is at least platinum or gold.

Art Unit: 2881

However Wood does teach that the metal is at least platinum or gold (paragraph 0096).

In view of this further teaching of Wood it would have been obvious to one of ordinary skill in the art at the time the invention was made that the metal is at least platinum or gold. Both of these metals are fairly inert, thus sample contamination is unlikely. Both of these metals, particularly platinum, are extremely strong for their molecular weight-the strength of the sample support can be increased significantly with only a thin application. And finely both are good conductors, so the energy transferred from the laser to the sample will not be inadvertently adsorbed by the sample holder, but will be transferred into the sample itself more thoroughly.

13. In regards to claim 3, Shen does teach that the bumpy structure of the sample support I arranged so that a plurality of concave portions are regularly formed (FIGS. 3-4 illustrate this).

14. In regards to claim 5, Shen does teach that an interval of the concave portions adjacent to each other is not less than 10 nm and less than 1 um (page 615, column 2, pores are 100 nm apart).

15. In regards to claim 6, Shen does teach that a width of each of the concave portions is not less than 10 nm and less than 1 um (page 615, column 2).

16. In regard to claim 7, Shen does teach that a depth of each of the concave portions is not less than 10 nm and less than 1 um (page 615, column 2, depth of 200 nm).

Art Unit: 2881

17. In regards to claim 8, Shen teaches that each of the concave portions is a hole (FIGS. 2-4).

18. In regards to claim 9, Shen as modified by Wood as discussed above fails to teach that when each concave portion is a trench, the concave portions are repeatedly disposed so that trenches in different directions intersect with each other.

However Wood does teach that when each concave portion is a trench, the concave portions are repeatedly disposed so that trenches in different directions intersect with each other (paragraphs 0123-0124).

In view of this further teaching of Wood it would have been obvious to one of ordinary skill in the art at the time the invention was made that when each concave portion is a trench, the concave portions are repeatedly disposed so that trenches in different directions intersect with each other. So doing allows for flow-paths to be formed in the substrate, so that rather than attempting to fill multiple nanometer-sized pores, the analyte may just be pored onto the device, and the remaining structure will naturally allow it to flow along the created channels. This would be much simpler to fill and prefer, which would have been obvious.

19. In regards to claim 10, Shen teaches that when each of the concave portions is a hole, the hole as a cylindrical shape (FIGS. 2-4).

20. In regards to claims 11-12, Shen teaches that the sample target is a semiconductor, namely silicon (see, i.e., abstract).

21. In regards to claim 14, Shen teaches the step of repeatedly forming finely bumpy structures of which has concave portions on a surface of a substrate in accordance with

Art Unit: 2881

lithography (page 613, column 2, "photopatterning", also pages 616-617) so that an interval of the concave portions of the convex portions ranges from 1 nm to 1 μ m and a depth of each of the concave portions ranges from 10 nm to 1 μ m (page 615 column 2 teaches the ranges) before the step of coating the face of the sample support with the metal, so as to form the sample support surface on the surface of the substrate (remember that Shen failed to teach the coating, thus this must rationally take place before-hand).

22. In regards to claim 17, Shen teaches a mass spectrometer comprising the sample target as set forth in claim 1 (see, i.e., abstract).

23. In regards to claim 18, Shen teaches that the mass spectrometer is a laser desorption ionization mass spectrometer which ionizes the sample to be measured by irradiating the sample so as to measure a molecular weight of the sample (title, abstract, FIGS. 5, 7-8, etc.).

24. In regards to claim 19, Shen teaches allowing ionization of the sample without using any matrix (see, i.e., page 612, column 2, which states it explicitly).

25. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shen as modified by Wood as applied to claim 14 above, and further in view of Regnier et al. (U.S. Patent Application Publication Number 20070054416, from hereinafter "Regnier").

In regards to claim 16, Shen as modified by Wood fails to teach that the concave portions are formed by using an electron beam drawing apparatus as the lithography.

Regnier does teach that the concave portions are formed by using an electron beam drawing apparatus as the lithography (paragraphs 0038-0039).

Art Unit: 2881

In view of the teaching of Regnier it would have been obvious to one of ordinary skill in the art at the time the invention was made that the concave portions are formed by using an electron beam drawing apparatus as the lithography. Though the precision is likely to be somewhat less than could be achieved with light (the size of the particle is the final determining factor in resolution, and a photon is smaller than an electron), the power behind an electron is greater, and as such harder and more resilient materials may be modified, which will lead to a longer-lasting and more robust sample holder, which is highly desirable.

Conclusion

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to NICOLE IPPOLITO RAUSCH whose telephone number is (571)270-7449. The examiner can normally be reached on Monday through Thursday 6:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (571)272-2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2881

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/N. I./

Examiner, Art Unit 2881

/ROBERT KIM/

Supervisory Patent Examiner, Art Unit 2881